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Roll storage system for sheet-like objects

The invention relates to a roll storage system for sheet-like objects, in particular banknotes, having a housing, in which a supply roll for a storage film and a storage roll connected to said supply roll are mounted so that they can rotate, and each roll is coupled to a roll drive, the storage film being guided between the supply roll and the storage roll over at least one deflection roller, and having a guide device for guiding sheet-like objects into and out of the coil on the storage roll.

Such a roll storage system is disclosed, for example, by DE 30 42 566 C2. In the solution described there, the guide device is formed by a pair of stationary rollers arranged close to the inlet slot of the housing, the storage film being guided over one of these rollers. The banknotes running in through the inlet slot of the housing thus pass onto the storage film and into the coil on the storage roll. However, guidance of the banknotes running in is only ensured as long as the distance between the roller gap of the stationary pair of rollers and the point at which the storage film runs onto the coil of the storage roll is shorter than the dimension of the banknote in the conveying direction. This requirement limits the difference in diameter of the storage-roll coil which can be used for the storage, and consequently limits the storage capacity of the storage roll.

A means of guiding the banknotes, which is independent of the abovementioned distance, between the stationary pair of rollers and the point at which the storage film runs onto the storage-roll coil can be achieved by using two storage films, which are led together on the stationary pair of rollers and which enclose the banknotes running in between them.

However, this solution, also described in DE 30 42 566 C2, has the disadvantage that two supply rolls are needed, with a corresponding drive mechanism, and that the storage-roll coil becomes thicker as a result of the dual film. Overall, although this means that the entire diameter range of the storage-roll coil can be used for the storage of banknotes, this is achieved at the expense of a relatively high technical outlay.

The invention is based on the object of specifying a roll storage system of the type mentioned at the beginning which, with a lower overall size and low technical outlay, has a relatively high storage capacity.

According to the invention, this object is achieved in that the guide device comprises a conveyor table which can be pivoted about a pivot pin fixed to the housing and can be adjusted parallel to the conveying direction, on which table there is arranged a transfer conveyor for guiding sheet-like objects into the coil and for removing sheet-like objects from the coil on the storage roll.

As a result of the conveyor table being arranged such that it can pivot, its plane can always be set, as the coil diameter changes, in such a way that it is oriented tangentially to the surface of the coil. The change, which occurs with the change in coil diameter, in the distance between an entry point for the sheet-like objects on the housing and the point at which the storage film runs onto the surface of the coil is compensated for by adjusting the conveyor table parallel to the conveying direction. This ensures that the sheet-like objects are guided independently of the current coil diameter, so that a significantly greater part of the coil diameter can be used for the storage of sheet-like objects than was previously usual. Trials have shown

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that, with the solution according to the invention, the storage capacity of the roll storage system operating with a storage film can be increased by 100% over conventional solutions.

The conveyor table is preferably guided by at least one extension in a slot guide fixed to the housing, in such a way that during a pivoting movement it is forcibly displaced parallel to the conveying direction. At the same time, the transfer end of the conveyor table, remote from the pivot pin, is expediently pretensioned so as to rest on the coil on the storage roll, so that the position of the conveyor table is automatically adapted to the coil diameter.

In a preferred embodiment of the invention, the transfer conveyor comprises a belt conveyor having an endless belt and supporting and back-pressure rollers interacting therewith. The endless belt is guided over a first roller, mounted coaxially with respect to the pivot pin of the conveyor table, and over a second roller, mounted on the conveyor table. The result of the translational adjustment of the conveyor table relative to the pivot pin is that the length of the endless belt must also change. Although this could, in principle, be counterbalanced by the use of an elastic endless belt, provided the adjustment travel is not very large, it is more expedient for the endless belt of the belt conveyor to be guided over a tensioning device which ensures that the tension, and therefore also the transporting properties of the endless belt, always remain constant.

This solution therefore ensures that the distance between the discharge end of the transfer conveyor and the transfer end of the conveyor table always remains constant, irrespective of the coil diameter of the storage roll and the distance between the entry point of the sheet-

like objects on the storage housing and the point at which the storage film runs onto the storage-roll coil.

The second roller of the belt conveyor is preferably arranged coaxially with respect to a deflection roller of the storage film and is fixed so that it rotates with said roller, so that the belt conveyor is driven by the storage film. This dispenses with a dedicated drive for the transfer conveyor and any necessary synchronization of such a drive with the drive of the storage roll.

Further features and advantages of the invention emerge from the following description which, in conjunction with the appended drawings, explains the invention using an exemplary embodiment. In the drawings:

Figure 1 shows a schematic side view of the roll storage system according to the invention in the direction of the axis of the storage roll, with a small diameter of the storage-roll coil,

Figure 2 shows a view corresponding to Figure 1 with a maximum diameter of the storage-roll coil, and

Figure 3 shows a schematic view of the conveyor table from below, that is to say in the direction of the arrow A in Figure 1.

The roll storage system illustrated in Figures 1 and 2 comprises a housing 10, in which a supply roll 12 and a storage roll 14 are mounted such that they can rotate about pins 16 and 18 fixed to the housing. A storage film 20 is connected both to the supply roll 12 and to the storage roll 14 and can be wound to and fro between these two rolls, forming a supply coil 22 and a storage-roll coil 24, respectively. For this purpose, the rolls 12 and 14 are connected to suitable

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drive devices (not illustrated). The storage film is guided between the supply roll 12 and the storage roll 14 over stationary deflection rollers 26, 28, 30 and a movable deflection roller 32 (Figure 3), which is mounted on a conveyor table (designated in general terms by 34), which is to be explained in more detail in the following text.

The conveyor table 34 has a frame 36 which, when the conveyor table 34 is adjusted between the positions illustrated in Figures 1 and 2, simultaneously executes a pivoting movement about a shaft 38 fixed to the housing and a translatory movement in the direction of the double arrow B, that is to say parallel to the conveying direction. For this purpose, the frame 36 has front and rear extensions 40, 42 which project laterally and engage in curved guide slots 44, 46 which are fixed in the housing, as is illustrated in Figures 1 and 2.

Furthermore, the conveyor table 34 comprises a transfer conveyor 48 for transferring banknotes to the storage-roll coil 24 and, respectively, for removing banknotes from the storage-roll coil 24. The transfer conveyor comprises a belt conveyor 50 having an endless belt 52. The latter is guided over two first rollers 54, mounted such that they can rotate at an axial distance from each other on the pivot shaft 38, and second rollers 56 which, together with the movable deflection roller 32, are mounted so that they can rotate on a shaft 58, which is held in the frame 36 of the conveyor table 34.

If the frame 36 of the conveyor table 34 is adjusted in the direction of the double arrow B, the distance between the shafts 38 and 58 changes. In order to keep the tension on the endless belt 52 constant during this change in the distance, in each case a tensioning device is provided, comprising two deflection rollers 59 and a tensioning roller 60, which is mounted on a pivoting lever 64 which is mounted such